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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|------------------------------|------------------|
| 10/804,379 | 03/19/2004 | Oleg Kolosov | 1012.188 (SMX6014.1-2003- | 7238 |
| 45735 | 7590 | 04/18/2007 | EXAMINER | |
| SENNIGER POWERS (SMX) ONE METROPOLITAN SQUARE 16TH FLOOR ST. LOUIS, MO 63102 | | | CHRISTENSEN, RYAN S | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2856 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | NOTIFICATION DATE | DELIVERY MODE |
|--|-------------------|---------------|
| 3 MONTHS | 04/18/2007 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/18/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspatents@senniger.com

Office Action Summary

Application No.

10/804,379

Applicant(s)

KOLOSOV ET AL.

Examiner

Ryan Christensen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| *Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 22-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Applicant has claimed the tuning fork being spaced at least the width of a tine from **any** adjacent structure. However, in figure 3, the resonator is touched by at least the following adjacent structures (118, 120 128). The resonator is like wise supported in some manner in all disclosed embodiments and figures.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
 1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 22-24, 26, 27, and 29 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent 6,269,686 (Hahn et al.) in view of U.S. Patent 5,243,756 (Hamburgen et al.) and U.S. Patent 6,494,079 (Matsiev et al.).
7. With respect to claim 22, Hahn et al. disclose a resonator sensor for analyzing a fluid (abstract), comprising an assembly (Fig. 1) an electronic component (integrated circuit, 17, Fig. 2) affixed a platform (11 and 12, Fig. 1) a resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) having a sensing surface for exposure to the fluid (bending reed, 1, Fig.1), the resonator being affixed to the platform with a spaced relationship between the sensing surface and the platform (spacing, 2, Fig. 1), the resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) being in electrical communication (4 and 5 Fig. 1) with the electronic component (integrated circuit, 17, Fig. 2 and Col. 6, lines 5-7). Hahn et al. discloses a spacing (Fig.s 1-3). Han et al. disclose the recess (2, Fig. 1) being large enough so that the bending reed can freely vibrate. Further, figures 1 and 2 of Han et al. illustrate the spacing (recess, 2, Fig. 1) between the mechanical resonator and the platform (11 and 12, Fig. 1) is roughly as deep (Fig. 1) as the mechanical resonator is wide (Fig. 2).
8. Hahn et al. suggest coupling the integrated circuit to the substrate but do not explicitly disclose a protective layer encapsulating at least a portion of the assembly. One of ordinary skill would look to the art of integrated circuits in

order to operatively attach the integrated circuit to the substrate of a sensor.

They would find U.S. Patent 5,243,756 (Hamburgen et al.), which discloses an integrated circuit (22, Fig. 1) encapsulated in liquid (40, Fig. 1) within a housing (12, Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system taught by Hahn et al. by encapsulating the integrated circuit in order to prevent moisture from corroding contacts with the integrated circuit (Hamburgen, Col. 2, lines 43-51).

9. Hahn et al. disclose a flexural resonator but do not expressly describe a tuning fork, in that the bending reed does not have at least two tines. However, U.S. Patent 6,494,079 (Matsiev et al.) disclose the use of mechanical resonators including tuning forks for measuring properties of fluids including viscosity (Col. 20, lines 31-42). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the by Hahn et al. by using a mechanical resonator that is a tuning fork because there is improved linearity when measuring the viscosity of fluids (Mastiev, Col. 10, lines 31-42).
10. With respect to claim 23, Hahn et al. further disclose the resonator being a coated or uncoated flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) and the flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) and a conductive path (4 and 5 Fig. 1) from the flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) to the electrical component.

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11. With respect to claim 24, Han et al. disclose the resonator being a flexural resonator so that its sensing surface can displace liquid in the sensors operation (Col. 2, lines 41-65).
12. With respect to claim 26, the combination as applied to claim 23, further discloses the protective layer encapsulating the integrated circuit (Hamburgen et al., Fig. 1), leaving the sensing surface of the mechanical resonator exposed to the fluid.
13. With respect to claim 27, Hamburgen et al. further disclose an operating range from -40°C to 66°C.
14. With respect to claim 29, Han et al. disclose the recess (2, Fig. 1) being large enough so that the bending reed can freely vibrate. Further, figures 1 and 2 of Han et al. illustrate the spacing (recess, 2, Fig. 1) between the mechanical resonator (bending reed, which has been replaced with the tuning fork in the combination as applied to claim 26) and the platform (11 and 12, Fig. 1) is roughly as deep (Fig. 1) as the mechanical resonator is wide (Fig. 2).
15. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 6,269,686 (Hahn et al.) in view of U.S. Patent 5,243,756 (Hamburgen et al.) and U.S. Patent 6,494,079 (Matsiev et al.) as applied to claim 26 above, and further in view of U.S. Patent 5,918,354 (Ikegami, et al.).
16. With respect to claim 28, the combination as applied to claim 26 does not explicitly disclose the sensing surface of the tuning fork resonator is coated with

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a support layer selected from a polymer, a ceramic, or combination thereof.

However, Ikegami et al. disclose the sensing surface of the tuning fork resonator is coated with a support layer selected from a polymer (Col. 8, lines 41-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system taught by the combination as applied to claim 26 by coating the tuning fork with a polymer because it is well known in the art to do this for performance tuning.

17. Claim 30 is rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent 6,269,686 (Hahn et al.) U.S. Patent 6,494,079 (Matsiev et al.).
18. With respect to claim 30, Han et al. disclose a resonator sensor for analyzing fluid (abstract), having a resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) with a sensing surface for exposure to the fluid (bending reed, 1; Fig. 1 and Col. 2, lines 41-65), the resonator being affixed to a platform (11 and 12, Fig. 1) with a spaced relationship between the exposed surface and the platform (Fig. 1), a support disposed between the platform and resonator (substrate, 10), a conductive path (4 and 5 Fig. 1) for receiving a response signal (Col. 2, lines 60-65) from the flexural resonator. Figure 2 illustrates that the recess (2, Fig. 1) cut from the substrate (10, Fig. 1) forms a housing comprising at least one wall that substantially surrounds the resonator while maintaining the exposure of the sensing surface to the fluid (Fig. 2 and Col. 2, lines 60-65). Han et al. also disclose the piezoelectric resonator is excited electrically (Col. 2, lines

45-46). There is inherently a conductive path from a power source in order to excite the piezoelectric resonator.

19. Hahn et al. disclose a flexural resonator but do not expressly describe a tuning fork, in that the bending reed does not have at least two tines. However, U.S. Patent 6,494,079 (Matsiev et al.) disclose the use of mechanical resonators including tuning forks for measuring properties of fluids including viscosity (Col. 20, lines 31-42). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the by Hahn et al. by using a mechanical resonator that is a tuning fork because there is improved linearity when measuring the viscosity of fluids (Mastiev, Col. 10, lines 31-42).

Response to Arguments

20. With respect to claim 30, applicant argues Hahn does not disclose a housing with at least one wall. However, the cavity (2) of Hahn et al. formed in the substrate (10) is considered to be a housing with one wall.
21. With respect to claim 30, applicant also argues there is no conductive path between the piezoelectrics and the resonator. However, there is a conductive path between the resonator 13 and a power source. (See Hahn et al. Col. 2, lines 45-46). Applicant is correct that the resonator 13 and the bending reed are mechanically coupled to each other. The piezoelectric resonator (13) coupled with the mechanical path and the bending reed (1) are considered to be the

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resonator, which is caused to resonate by "electrical excitation" which implies a conductive path to a power source.

22. With respect to claims 22-30, applicant argues combining Hahn et al. with a coating would render the invention disclosed in Hahn et al. inoperable because Hahn does not account for the change in mass of the resonator that would result from applying said coating. However, it is not necessary for the primary reference in a combination to provide means for making modification (see MPEP 2145 Section III). It is enough that one of ordinary skill in the art would be aware of the advantage of the modification and it would be within his purview to make the modification.

Pertinent Prior Art

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
24. U.S. Patent 5,644,273 (Kaida et al.) discloses a tuning fork type mechanical resonator where a portion is covered by a substrate for a protective layer.
25. U.S. Patent Publication 2002/0120296 (Mech et al.) discloses an integrated circuit on a sensor which is coated/encapsulated with a protective layer.
26. U.S. Patent 6,498,043 (Schulman et al.) discloses another sensor with an integrated circuit where the circuit is protected with a film and a portion is left exposed in order to make measurements or take readings.

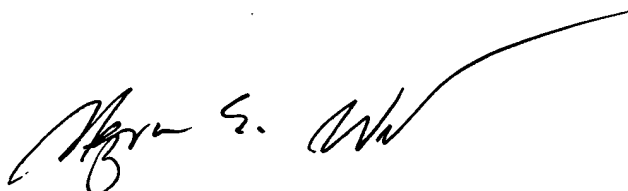
Conclusion

27. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
28. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.
29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Christensen whose telephone number is 571-272-2683. The examiner can normally be reached on Monday - Friday, 8am - 5pm.
30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
31. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RC



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